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Eliminating Radioactive Mixed Waste From Machining Operations*

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Radioactive mixed waste (radioactive and hazardous) can be eliminated from plutonium machining operations by substituting HFE-7100 (a recently available non-hazardous liquid) for trichloroethylene (a hazardous liquid) as the machining coolant/lubricant. Since plutonium machining is performed in a glovebox environment, typical glovebox materials (gasket, filter, window, glove, etc.) were exposed to HFE liquid and vapor for about a month to ensure that exposure to HFE is benign to the materials. Indeed, in these simplified compatibility tests, none of the materials exhibited any changes attributable to being exposed to HFE. However, more controlled indepth compatibility tests are required to determine potential long-term effects. The use of HFE as a coolant/lubricant was evaluated by machining test pieces of tantalum (a non-radioactive material which is more difficult to machine than plutonium) and plutonium. HFE performed as well as trichloroethylene (for plutonium machining) and perchloroethylene (for tantalum machining), the previously used liquids. If a coolant/lubricant is required for future plutonium machining, the use of HFE is recommended to eliminate the creation of radioactive mixed waste.

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